Sets

Note 1

097312afe75d4a3d9eaa0c1f4c63748a

Intuitively speaking, {{c2::a set}} is {{c1::a collection of objects.}}

Note 2

85e21cf985524b80a8c00eb4608f34be

Intuitively speaking, a set is a collection of objects. {{c2::Those objects}} are referred to as {{c1::the elements of the set.}}

Note 3

12b96daebbc04070b74e2a6f74e5b268

Given a set A, we write {{c2::$x \in A$}} if {{c1::x is an element of A.}}

Note 4

b25d749749a64c5b90880253d9839da8

Given a set A, we write {{c2::$x \notin A$}} if {{c1::x is not an element of A.}}

Note 5

39565306ec4e40e18136e7eb88fc817a

Given two sets A and B, {{c1::the union}} is written {{c2::$A \cup B$.}}

Note 6

73bf0eb1d16c4c5da368e326b4739d5b

Given two sets A, and B, {{c2::the union}} is {{c3::defined}} by the rule

{{c1::$x \in A \cup B$ provided that $x \in A$ or $x \in B$.}}

Note 7

8ce7db157931494bbfb6eee706e15efc

Given two sets A and B, {{c2::the intersection}} is written {{c2::$A \cap B$.}}

Note 8

6a277df52de2409a98e48429d69b6d05

Given two sets A and B, {{c2::the intersection}} is {{c3::defined}} by the rule

{{c1::$x \in A \cap B$ provided that $x \in A$ and $x \in B$.}}

Note 9

684951afc378458aa7bd27e67cdc499b

{{c2::The set of natural numbers}} is denoted {{c1::$\mathbf{N}$.}}

Note 10

49d36a026d4b4678ab86fb6103571cce

$$\text{\{\{c2::}\mathbf{N}\text{\}\}} \overset{\text{def}}{=} \left\{\text{\{\{c1::}1, 2, 3, \ldots\text{\}\}}\right\}.$$

Note 11

797c81e5adb543e1a5d4cc67e64c5e09

{{c2::The set of integers}} is denoted {{c1::$\mathbf{Z}$.}}

Note 12

d3c61bf891744c58b73cef543c6e100d

$$\text{\{\{c2::}\mathbf{Z}\text{\}\}} \overset{\text{def}}{=} \left\{\text{\{\{c1::} \ldots, -2, -1, 0, 1, 2, \ldots\text{\}\}}\right\}.$$

Note 13

57f085776972449f8bc14daf5cff6603

{{c2::The set of rational numbers}} is denoted {{c1::$\mathbf{Q}$.}}

Note 14

f7e3370650134607853b41b2b1ecf54b

$$\text{\{\{c3::}\mathbf{Q}\text{\}\}} \overset{\text{def}}{=} \left\{\text{all \{\{c1::fractions } \frac{p}{q}\text{\}\} where \{\{c1::}p, q \in \mathbf{Z} \text{ and } q \neq 0\text{\}\}}\right\}.$$

Note 15

faeac83cb5b740b6964551c85ad3e35b

{{c2::The set of real numbers}} is denoted {{c1::$\mathbf{R}$.}}

Note 16

6e5da98964d645d09ad6989e85679c74

{{c2::The empty}} set is {{c1::the set that contains no elements.}}

Note 17

206db0a0f3d042e49a9ca532e222201f

{{c2::The empty set}} is denoted {{c1::$\emptyset$.}}

Note 18

2f0448d226db4b71b150acaed349a73b

Two sets A and B are said to be {{c2::disjoint}} if {{c1::$A \cap B = \emptyset$.}}

Note 19

e5d9d365e86640319ca5460ef8c4f05c

Given two sets A and B, we say {{c2::A is a subset of B,}} or {{c2::B contains A}} if {{c1::every element of A is also an element of B.}}

Note 20

c2bd27f1fc0d40e296dceef9c9789556

Given two sets A and B, the {{c3::inclusion}} relationship {{c2::$A \subseteq B$ or $B \supseteq A$}} is used to indicate that {{c1::A is a subset of B.}}

Note 21

333e7c6716af48b7b9962ad803f0732f

Given two sets A and B, {{c2::$A = B$}} means that {{c1::$A \subseteq B$ and $B \subseteq A$.}}

Note 22

74e93b42d46746dc9ec2b54f8366c435

Let $A_1, A_2, A_3, \ldots$ be an infinite collection of sets. Notationally,

$$\bigcup_{n=1}^{\infty} A_n, \quad \bigcup_{n \in \mathbf{N}} A_n, \quad \text{or} \quad A_1 \cup A_2 \cup A_3 \cup \cdots$$

are all equivalent ways to indicate {{c1::the set whose elements consist of any element that appears in at least on particular A_n.}}

Note 23

69e4627a3e7149ef8be05479a2587b41

Let $A_1, A_2, A_3, \ldots$ be an infinite collection of sets. Notationally,

$$\bigcap_{n=1}^{\infty} A_n, \quad \bigcap_{n \in \mathbf{N}} A_n, \quad \text{or} \quad A_1 \cap A_2 \cap A_3 \cap \cdots$$

are all equivalent ways to indicate {{c1::the set whose elements consist of any element that appears in every A_n.}}

Note 24

11a987e10fce4ceea69672f366597729

Given $A \subseteq \mathbf{R}$, {{c2::the complement of A}} refers to {{c1::the set of all elements of $\mathbf{R}$ not in A.}}

Note 25

8b379552450b4672af82c17476c0ff13

Given $A \subseteq \mathbf{R}$, {{c2::the complement of A}} is written {{c1::A^c.}}

Note 26

a3459afa53264a7c82d9abd760a0c93e

Given $A, B \subseteq \mathbf{R}$,

$$\{\{c2::(A \cap B)^c\}\} = \{\{c1::A^c \cup B^c.\}\}$$

«{{c3::De Morgan's Law}}»

Note 27

c983927aa0304e51949e2f90a2ec2614

Given $A, B \subseteq \mathbf{R}$,

$$\{\{c2::(A \cup B)^c\}\} = \{\{c1::A^c \cap B^c.\}\}$$

«{{c3::De Morgan's Law}}»